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REVIEW ON CHURNA KALPANA

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ABSTRACT

Ayurved has a long and strong heritage use of Polyherbal drugs and formulations to treat various diseases. Different formulations have been described by Acharyas, such as Panchavidha Kashaya Kalpana, where ChurnaKalpana is the Upakalpana of Kalka Kalpna. In Ayurvedic pharmaceutics, the concept of churna is well established for medicinal purposes as well as the manufacturing of other formulations. In Ayurveda, there is a thorough discussion of the various methods of preparation as well as the shelf life duration. Churna is the most basic kind of Ayurvedic medication that may be created quickly. The Churna that we are going to make should be based on Ayurvedic classics or India's Ayurvedic formulary (AFI). The necessity for time to standardise the churna has implications for the current analytical techniques. In present scenerio, there is new machinery have invented, the process of Churna preparation become a very easy task. All the required herbs are cleaned, dried and powdered together by disintegrators. Mechanical sifters are also used in this process. There are different herbal containing churnas are sold in the market for various ailments both in Acute and Chronic conditions. In this review, an attempt is made to gather all the information about classical and modern aspects of Churnakalpana.

KEYWORDS: Churna, Powder, Attrition, Hammer Mill, Tumbler Mixer & Total Ash Etc

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INTRODUCTION

Ayurvedic medicine is considered to be world's oldest medicine system. Ancient Acharyas have described different forms of formulations like Panchavidha Kashaya Kalpana where in Churnakalpana is Upakalpana of Kalka kalpana. Which is the simplest form of Ayurvedic medicine can be easily prepared, administrated with more shelf life, high therapeutic value and palatability, and accepted by all age groups. Churna is a well-known concept in Ayurvedic pharmaceutics, both for medicinal purposes and for the development of other formulations. In Ayurveda, there is a thorough discussion of the various methods of preparation as well as the shelf life duration. The importance of modern analytical approaches is the need to standardise various Churnas throughout time.

Definition

Churna is a fine powder of a drug or drugs[1].

The term churna can refer to a single drug's powder or a mixture of two or more medications that have been powdered separately before being blended to homogeneity.

Churna is a term that refers to finely powdered dry medications that are filtered through a cloth. The synonyms for Churna are Rajaha or Ksoda, and it is recommended to be taken in a dose of one karshapramana[2].

Churna is the name given to a substance that has been finely pulverised. This Churna is employed in Grahaniroga, Amavikara, Vrana, and Anjana, among other things[3]

.A dry powder, filtered through a fine cloth is called as Churna[4].

Vernacular Names[5]

English : Powder

Sanskrit : Suska Kalka, SuskaPista, Ksoda, Raja

Hindi : Churna

Kannada: Pudi, Hittu, Churna

Latin : Pulver, Pulverata

Urani : Safof, Atus, Avadhilana

Types

- Sthulachurna
- Sukshmachurna
- AtyanthaSukshmachurna

Praksepadravyas and their Quality[6]

- Guda Equal to that of Churna
- Sarkara Two times the quantity of Churna
- Hingu Quantity which does not cause utkleda
- (Nausea) and must be used after frying.
- Ghrita, Taila, Madhu - 2 parts
- Dugdha, Jala or any liquids - 4 parts

Method of Preperation[7]:

The drug mentioned in the churna yoga are cleaned and dried. They are powdered by pounding with mortar and pestle and sieved through thin layers of cloth. In a prescription in which there are a number of ingredients, the best method is to powder the drug separately, weigh the required quantities of the drugs and mix them all together.

The reason for separate powdering of different drugs in Churnakalpana is that different drugs will have different types of consistency as soft, medium and hard. If they are mixed and pounded together first soft dravyas get powdered easily, hard dravyas remain as it is, hence while doing filtration variation in the ratio ingredients mentioned in Churna formula may take place. Further drugs, which contain volatile oil, may evaporate easily and burnt some times before hard dravyas get powdered uniformly. Manufacturing on a large scale in pharmacies. Powdering is done with disintegrators, pulverizers, and ball mills, among other things. Mechanical sifters are used to sort vast amounts of material in a short

amount of time.

Preservation

Churna should be packed in airtight container.

Important uses of Churna:

- Used as main medicameant in the treatment of many diseases eg: Talisadichurna, Hingvastakachurna, Sankapuspichurna etc.
- Churnas could be used as adjuvants.
- SuvarnaBhasma with Trikatuchurna
- AbhrakaBhasma with Talisadichurna
- Churnas are used to prepare vati, avaleha, arka, kashaya, hima, phanta, sneha, kshirapaka, asavarista preparations etc.
- Powders are used externally : For Avadhulana (Sprinkling), Lepana in wounds and skin diseases.

Shelf life[8]: 2 months according to Sharangadhara

1 year according to AFI[9]

2 years according to Official GazetteofIndia[10]

Dose[11] : 1 Karsa = Approximately 12 grams

Modern Aspects of Churna Kalpana [12]

Steps of Churnakalpana procedure can be co-related with the modern techniques like size reduction which tells Mardana, Size separation which mentions Sivana and Mixing of powders which explains mixing of more than one drug. An attempt is made to explain about these techniques as below.

Powders are a solid dose type of medication that can be used both internally and externally. They come in crystalline and amorphous forms. Though, the drugs are prepared with many different physical forms and types but many of them are prepared using powders in one way or the other.

According to Modern, ChurnaKalpana can be adopted by below techniques;

- Size Reduction
- Size Separation
- Mixing of Powders

Size Reduction

The process of reducing pharmaceuticals (vegetable and chemical substances) into smaller bits, coarse particles, or fine powder is known as size reduction.

Importance of Particle size Reduction

The process of size reduction is commonly employed in pharmaceutical industries due to the following reasons:

- To increase the rate of solution in case of chemical substances, because reduction of the particle size increases the surface area for the action of solvent.
- To allow the rapid penetration of the solvent (menstrum), in case of crude drugs for the extraction of active constituents from vegetable and animal drugs.
- To get a uniform powder because particle size reduction helps in uniform mixing of drugs, required for preparing different formulations for administration.
- To increase the rate of absorption of a drug. The smaller the particle size, the greater is the rate of absorption.

Methods of Size Reduction

The following are the methods of size reduction, in which different mechanisms are involved:

- Cutting
- Compression
- Impact
- Attrition
- Combined impact and attrition

1. Cutting: A sharp blade, knife root cutter, or other sharp device is used to cut the material on a tiny scale. A cutter mill is utilised on a huge scale. Cutting medications is frequently done to speed up the drying process.

Cutter Mill

Principle: the size reduction is done by cutting with the help of sharp knives.

Working: The material to be chopped is placed in the mill's hopper. The rotor spins at a fast rate. The material comes quite close to the stationary knives and spinning knives due to the rotor's rotation. It shreds the material into little fragments. The material is retained in the mill by the screen until the appropriate degree of size reduction has been achieved. The product that comes out of the sieve is collected.

Uses: The mill is used to obtain a coarse degree of size reduction of soft materials such as roots, peels or wood before extraction.

2. Compression: The material is crushed by applying pressure to it in this way. On a small scale, size reduction is accomplished with a pestle and mortar, while on a larger scale, a roller mill is employed.

Roller Mill

Principle: By applying pressure to the substance, it gets crushed. The mill operates on the principle of material compression by applying pressure to it.

Working: The material to be crushed is fed into the gap between the two rollers via a hopper. The material is

crushed by the rotation of these rollers. The size reduction can be controlled by adjusting the space between the rollers.

Uses: Before extracting fixed oil from seeds, the roller mill is used to crush and shatter the seeds. It's also used to break soft tissues in order to aid solvent penetration during the extraction procedure.

3. Impact: When a substance is more or less immobile and is struck by a fast-moving object, or when a moving particle collides with a stationary surface, impact occurs. The substance fractures into little bits in both cases. There is no apparatus that can be utilised to reduce size via impact on a tiny scale. When material size reduction is done by impact, however, hammer mills and disintegrators are utilised on a big scale.

Hammer Mill

Principle: It works on the impact principle, which states that the material is more or less stationary when it is struck by a fast-moving object.

Working: The material is loaded into a hopper that is attached to a drum. Due to the quick rotation of hammers, the material is powdered to the proper size and gathered under the screen. This mill has the advantage of continuous operation because the hammers are not fixed, so there is less possibility of jamming. The mill can generate powder that is coarse to relatively fine.

Heat is generated as a result of the rapid speed of operation, which may affect thermolabile medications or materials. Furthermore, if foreign items such as stone or metal are present in the feed, high speed operation damages the mill.

Uses: Except for sticky materials that clog the screen, the hammer mill is used to produce intermediate grades of powder from practically all sorts of substances.

Disintegrator

Principle: The size reduction in disintegrator is done by impact.

Working: The beaters are primarily responsible for grinding, however the undulation of the inner surface and the roughness of the drum aid in this process. The material is delivered to the beaters via a hopper attached to the drum. The impact of the beaters breaks the material into minute bits. The air velocity inside the chamber is increased due to the high velocity of the beaters. The air is permitted to pass through an exit linked to the dust bag, which traps the small powder particles.

Uses: The mill is used to powder a variety of medications, including those that are extremely difficult to powder. To get fine powder, the medicine should be dried before feeding it into the disintegrator. Use fairly small bits to keep the disintegrator's beaters from jamming.

4. Attrition

Attrition applies compression pressure to the material, yet the surfaces move relative to each other, resulting in shear forces that break the particles. The size reduction by attrition is done on a laboratory scale with a pestle and mortar, but on a larger scale, a roller mill can be utilised.

5. Combined Impact and Attrition

In order to achieve a better output, the mill's impact and attrition mechanisms might be combined. The mills that use impact and attrition to reduce particle size are listed below.

Ball Mill

Principle: It works on the principle of impact and attrition.

Working: The medicine to be ground is placed in the mill's cylinder and spun. The rotational speed is really essential. At low speeds, the mass of the ball will slide or roll over each other, resulting in just a minor reduction in size. The balls will be thrown out to the walls by centrifugal force at high speeds, and no grinding will occur. However, at roughly 2/3 of the speed, the centrifugal force reaches the mill's top and then falls in. The impact of particles between the balls, as well as attrition between the balls, affect the maximum size decrease in this way. After a certain amount of time has passed, the material is removed and sieved to obtain powder of the desired size.

Uses: The mill is used to grind brittle drugs to fine powder.

Size Separation

The size reduction procedure is usually followed by size separation of the powdered material. It is impossible to get particles of uniform size during the size reduction procedure. As a result, a special technique known as the "process of size separation" is used to separate particles of a specified size. The size separation process can be applied to particle size measurement, in which the proportion of each size of particle in a sample is determined and data is used to control raw material or maintain the quality of a manufactured product.

Official Standards for Powders

The Indian Pharmacopoeia has established guidelines for powders used in pharmaceuticals. According to this, the coarseness or fineness of a powder is measured in terms of the nominal mesh aperture size of the sieve through which it can pass.

The I.P. specifies five grades of powder of which are as under:

- **Coarse Powder :**Coarse powder is defined as a powder that passes through a sieve with a normal mesh aperture of 1.70 mm (no. 10 sieve) and not more than 40.0 percent of the particles pass through a sieve with a nominal mesh aperture of 355 m (no. 44 sieve).
- **Moderately coarse powder:**Moderately coarse powder is defined as a powder that passes through a sieve with a nominal mesh aperture of 710 m (No. 22 sieve) and not more than 40.0 percent through a sieve with a normal mesh aperture of 250 m (No. 60 sieve).
- **Moderately fine powder:**This group includes powders that pass through a sieve with a nominal mesh aperture of 355 m (No. 44 sieve) and not more than 40.0 percent through a sieve with a nominal mesh aperture of 180 m (No. 85 sieve) but not more than 40.0 percent through a sieve with a nominal mesh aperture of 180 m (No. 85 sieve).
- **Fine powder:**Fine powder is defined as all particles passing through a sieve with a nominal mesh aperture of 180 m (No. 85 sieve).

- **Very fine powder:**It is termed to be very fine powder if all of the particles pass through a sieve with a nominal mesh aperture of 125 m (No. 120 sieve)

Table No. 1 Relevant Grades of Powder and Sieve Numbers along with a Nominal Mesh Aperature

S.No	Grade of Powder	Sieve through which all Particles must Pass	Nominal mesh Aperture size	Sieve through which 40% of Particles Pass	Nominal Mesh Aperture Size
1.	Coarse powder	10	1.7 mm	44	355 µm
2.	Moderately coarse powder	22	710 µm	60	250 µm
3.	Moderately fine powder	44	355 µm	85	180 µm
4.	Fine powder	85	180 µm	-	-
5.	Very fine powder	120	125 µm	-	-

The Pharmacopoeia has prescribed upper and lower limits for the three coarse grades of powder. For two fine grades of powder the pharmacopoeia has prescribed only the upper limit.

When a powder's fineness is expressed as a number, it indicates that all of the powder's particles must pass through a sieve with a nominal mesh aperture in micrometres equal to that number.

Mixing of Powders

Powder mixing is a typical pharmaceutical procedure that is employed in the manufacture of a variety of formulations, including tablets, capsules, and compound powders.

Mixing Mechanisms: A combination of one or more of the methods listed below is used to mix solids:

- Convective mixing
- Shear mixing
- Diffusion mixing

The precise mixing of powders is influenced by a variety of physical qualities. These are enumerated below:

- article size
- Particle shape
- Particle attraction
- Material density
- Proportions of materials

Equipment Used for Mixing of Powders

Powders are mixed in the laboratory using a pestle and mortar or a drug spatula. The procedure is known as 'trituration.' The following equipment is used to mix powders on a big scale:

1. **Tumbler mixer:** It comprises of a metallic vessel in which granules are mixed slowly by hand or with the assistance of an electric motor. The ingredients cross each other due to rotation. For mixing large batches of

powders, the powders are mixed in a vessel with baffles to ensure thorough mixing. Tumbler mixers are typically composed of stainless steel and come in a variety of shapes and sizes, including cubical, V-shaped, Y-shaped, and cylindrical. An electric motor with sufficient horse power rotates these at a sluggish speed. The vessel's rotation should be slow enough that the powder does not stick to the side of the jar, which is held in place by centrifugal force, but is lifted by baffles and falls over continually.

2. **Double cone blender:** It was created in an attempt to address some of the flaws of rotating mixers. The tumbling and shearing motion of the blade in a double cone blender causes the powder to combine. The stainless steel double cone blender comes in a variety of capacities ranging from 5 kg to 200 kg or even more. The speed at which the blender rotates determines its efficiency. The rate of rotation should be optimal, which is determined by the tumbler's size and form, as well as the nature of the material to be mixed. The most frequent speed range is 30-100 rpm. The material to be blended takes up about 50 to 60 percent of the blender's overall capacity. The mixture undergoes a tumbling action as the blender rotates, fully mixing the substance. Shearing action can also be achieved by fixing the agitator blade.
3. **Agitated powder mixer:** It consists of a fixed tank or trough with a rotating arm that applies shearing action to the particles. General mixing necessitates end-to-end movement, which can be achieved by connecting helical blades to the agitator. Mixing free-flowing powdered materials with consistent particle size and density is usual with the mixer.
4. **Air Mixer:**Pneumatic mixers, also known as air-mix mixers or air-driven mixers, mix or homogenise materials or powders using compressed air or air bubbles rather than electricity. The expansion of a powder bed by gas causes particles to reorient in respect to one another.

Analytical Aspects of Churna Kalpana[13]

Physical Parameters

- Color, aroma, texture, and taste are examples of organoleptic features.
- Moisture content: It influences the aggregation of hygroscopic materials' particles. Color and odour alterations have been noted on occasion.
- Particle size: The size of the particle, as well as the surface area of the powder, can influence the qualities of the powder. The surface area of the particle rises as the particle size decreases, and vice versa.
- Flowability: Unless specially processed, the majority of powders do not flow freely as liquids. Poor flow characteristics of Churna or powders could be caused by the following factors:

Powder cohesion necessitates the application of a force known as surface force. Van der Waals and electrostatic forces are primarily responsible for surface forces.

Particles may interlock due to their uneven form, bridging and arching.

Interparticular friction happens when particle surfaces are rough, which impairs powder cohesiveness and consequently flow.

To increase the flow properties of powder, some techniques include raising the average particle size, creating powder in the shape of spherical particles, and admixtures of additives.

Chemical Parameters

- Extracted values (in selective solvents), volatile matter content: The most often used solvents for extracting pharmaceuticals are water, alcohol, and a mixture of these two liquids.
- Total ash: The proportion of ash in a crude medication is a quality indicator as well as a purity indicator.
- Acid-insoluble ash: This indicates impurities and should be kept to a minimum.
- Thin-layer chromatography/High-performance liquid chromatography (HPLC): HPLC allows for the detection of very minute levels of degradation.

Microbiological Parameters

- Total viable count: It provides a quantitative estimate of the number of microorganisms present. The number of colonyforming units per gramme or millilitre of the sample is represented by the count.
- Count of yeast and mould in powder and powder drug ingredients: This method can be used to count yeast and mould in powder and powder medicinal ingredients.
- Coliform count and other pathogens: A water contamination test in which the number of colonies of the coliform bacterium Escherichia coli are counted per 100 mL of water and the result is expressed as coliform microbial density, which shows the amount of faeces in the water.

CONCLUSIONS

Churna is a important dosage form in pharmaceutical field with more shelf life and administered profusely internally and externally. Stability in powders is more when compared with other liquid preparations, churnas are easily absorbed and metabolized as a result of which the onset of action will be early.

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